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REMARKSA. Request for the Entry of the Claim Amendments after Final Office Action

Applicants made some amendments to the claims for responding to the final Office Action. These amendments are in compliance with 37 CFR 1.116. Claim 4-8, 12-16, and 19 have been cancelled as nonelected claims by Restriction/Election requirement. According to the Examiner's requirements, claims 2, 3, 10 and 11 have been amended to cope with the claim objections and to clarify the 35 USC 112 ambiguities. Claim 1 has been amended by adding "stepwisely". This amendment is necessary to emphasize the thread line of the present invention being free of downward angles. "Stepwisely" was not present previously because the applicants in no way could expect the examiner would interpret the indentations or grooves at the thread line of Pearson as mild lead angles and steep lead angles continuously along a spiral line, as claimed in previous Claim 1.

These amendments do not raise new issues that would require further consideration and/or search. Pursuant to 37 CFR 1.116 (b), the applicants request the amendments to be entered.

Applicants have carefully considered the matters raised by the Examiner in the outstanding Office Action but remain of the position that patentable subject matter is present. Applicants respectfully request reconsideration of the Examiner's position based on the amendments to the claims and the following remarks.

B. The Invention

The present invention is directed to a combination of a multi-pitch screw and a multi-pitch nut. In one of the novel aspects of the invention, the thread of the multi-pitch screw and the thread the multi-pitch nut are formed such that sections having a mild lead angle and sections having a steep lead angle are arranged alternately, continuously and stepwisely during a single turn along a spiral line. These alternating sections create a "multi-pitch" stepwise thread which continually going up without any downward lead angle.

The combined screw and nut of the present invention are illustrated in Figures 1-4 of the application. As shown in Figure 1, thread 12 of multi-pitch screw 10 alternates between mild lead angle sections 12a, 12c, which have a lead angle equals to or exceeds zero degree, and steep lead angle sections 12b, 12d, which have a lead angel exceeds zero degree. The male thread 12 forms a stepwise progress without a downward lead

angle as thread 12 spirals around shaft 11 of multi-pitch screw 10. Similarly, Figure 3 shows that female thread 22 of multi-pitch nut 20 alternates between mild sections 22a, 22c and steep sections 22b, 22d. The female thread 22 therefore is also progressing stepwisely without a downward lead angle.

This stepwise continuity facilitates the self unlock and lock stepping feature of this invention. It is illustrated in Figures 4(A)-4(B) and described on page 18, par. 1 to page 21, par. 1. Figure 4(A) shows the condition where a gap exists between thread 12 of multi-pitch screw 10 and thread 22 of multi-pitch nut 20. In this condition, screw 10 does not contact nut 20 and the self-locking condition is not achieved.

In Figure 4(B), multi-pitch nut 20 is urged in the direction of arrow F1. As a result, the flat sections of the multi-pitch nut mate with the flat sections of the multi-pitch screw, while the angled sections of the multi-pitch nut mate with the angled sections of the multi-pitch screw. Since the flat and angled sections mate, the multi-pitch screw cannot rotate due to frictional forces between the mating surfaces (see page 19, lines 3-15). The multi-pitch screw and multi-pitch nut are therefore self-locked.

C. Claim Status and Amendments

In the Office Action, claims 1-8 and 10-19 are pending. Of the above claims, claims 4-8, 10-16 and 19 are withdrawn from consideration and cancelled in this amendment. Claims 1-3, 10, 11, 17 and 18 are presented for further prosecution

Claim 1 has been amended by adding the element of "stepwise", which requires the thread line to be free of downward angles. The support of this amendment can be seen from Figures 1 and 3.

Claim 2, and 10 have been amended by reciting zero degree lead angle forming a flat step of the thread to clarify the informality of the perpendicularity in 3 dimension settings. Supports of these amendments are in the original claim languages.

Claims 3 and 11 have been amended for the stepwise self-lock and unlock feature of the invention by directly reciting the flat sections with a mild lead angle stepwisely lock and unlock the screw movement by engaging and disengaging the direct contacts of the flat sections. The support of this amendment is in the Figure 4.

Claims 4-8, 12-16, and 19 have been cancelled as nonelected claims by Restriction/Election requirement.

D. Rejections under § 112, second paragraph

Claims 3 and 11 had been rejected as indefinite. The Examiner had stated that the self-lock angle is unclear.

As discussed above, Applicants have amended claims 3 and 11 to replace "an angle which causes said multi-pitch screw to lock with said multi-pitch nut" as "lead angle of said sections having a mild lead angle of the male screw, thus stepwisely lock and unlock the screw movement by engaging and disengaging the direct contacts of the sections" As explained on page 19, lines 3-15 and shown in Figure 4(B), when the thread of the multi-pitch nut mates with the thread of the multi-pitch screw, the screw is prevented to rotate back because the frictional force between the mating flat sections is greater than the frictional force between the mating steep sections.

Applicants respectfully submit that claims 3 and 11 are definite.

E. Rejections under § 102(b)

Claims 1, 2, 10, 17 and 18 had been rejected as being anticipated by Pearson (US 113,557). The examiner has taken the position that Pearson has taught every element of the present invention.

As discussed in the Claim Amendment section of this response, Claim 1 has been amended by adding the element of "stepwise", which requires the thread line to be free of downward angles. Claim 2, and 10 have been amended by reciting zero degree lead angle forming a flat step of the thread to clarify the informality of the perpendicularity in 3 dimension settings. There is no downward angle either.

Pearson teaches a combination of a screw and a nut with " a series of indentations or grooves. As the examiner recited, for an indentation or groove, there must be a "downward angle" and a "upward angle". It is obvious from the figures in this invention, the thread line is stepwisely continually going up (or down by the point of view). There is no downward angle in the thread lead line of the present invention.

Applicants therefore respectfully submit that claim 1 is not anticipated by Pearson because Pearson does not teach or

suggest a stepwise thread line with the lead angles at least zero degree.

Applicants respectfully submit that Pearson does not teach all the elements of the present invention, and therefore does not anticipate the claims 1, 2, 10, 17 and 18.

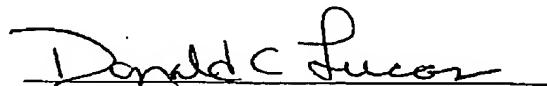
F. Conclusion

In view of the foregoing and the enclosed, it is respectfully submitted that the application is in condition for allowance and such action is respectfully requested. Should any extensions of time or fees be necessary in order to maintain this Application in pending condition, appropriate requests are hereby made and authorization is given to debit Account # 02-2275.

Respectfully submitted,

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